

AMENDMENTS TO THE CLAIMS

Please amend the claim set as shown below:

1. (currently amended) A tire building drum (700) having an axis (704), a center section (720) and two end sections (722, 724); wherein:

each end section is provided with an expandable bead lock assembly (726) having a plurality of axially extending, circumferentially spaced-apart finger segments (F) adapted for gripping a bead; such that each of the finger segments being-is expandable from a first finger radius in a collapsed condition of the bead lock assembly, to a second finger radius in a semi-expanded condition of the bead lock assembly, and to a third finger radius in a fully expanded condition of the bead lock assembly;

each bead lock assembly comprises: a carrier ring; a plurality of radially expandable segments; and a plurality of elongate links extending between, and pivotably connected at respective ends to, the carrier ring and radially inner ends of the expandable segments; wherein the finger segments are disposed at radially outer ends of the expandable segments; and wherein axial movement of the carrier ring causes radial movement of the expandable segments and the finger segments; and

the tire building drum further comprises: a cylinder having a cylindrical piston portion; a first piston disposed in the piston portion; a second piston disposed in the piston portion axially between the first piston and the carrier ring; and at least one rod connecting the second piston to the carrier ring;

wherein axial movement of the second piston causes axial movement of the carrier ring; and

wherein axial movement of the first piston indirectly causes axial movement of the carrier ring only by axially pushing the second piston.

2. (canceled)

3. (canceled)

4. (currently amended) The tire building drum of claim 1-3, further comprising:

at least one rod ((R1P1, R2P1, R3P1) extending from the first piston (P1) through an end plate (734) of the cylinder (730), for limiting axial movement of the first piston (P1).

5. (currently amended) The tire building drum of claim 4, further comprising:

pneumatic lines (742,743,744) connecting to passageways (PW1,PW2,PW3) within the cylinder;

wherein by selectively applying pressurized air in the pneumatic lines, the first and second pistons can be moved axially within the piston portion of the cylinder.

6. (original) The tire building drum of claim 5, wherein:

the first piston and the second piston are each generally in the form of flat discs, and both are centered on the axis, and each has substantially the same outer diameter as the other.

7. (canceled)

8. (currently amended) The tire building drum of claim 1, wherein:

the center section is circumferentially segmented, having a plurality of elongate fixed segments (226) alternating with a like plurality of elongate expanding segments (728).

9. (currently amended) The tire building drum of claim 8, wherein:

the expanding segments are axially-extending-and-circumferentially-spaced-from-one-another, and both axial end portions of the expanding segments are contoured to have annular recesses (236) in their radially outer surfaces at positions corresponding to the positions of sidewall inserts (506, 510) which will be applied to a tire carcass being laid up on the drum; and

each of the expanding segments is positioned at a first drum radius when the drum is in ~~the~~ a collapsed condition, at a second drum radius when the drum is in ~~the~~ a semi-expanded condition, and at a third drum radius when the drum is in ~~the~~ a fully expanded condition.

10. (currently amended) The tire building drum of claim 9, wherein:

each of the finger segments is positioned at the first finger radius when the drum is in the collapsed condition, ~~to~~ at the second finger radius when the drum is in the semi-expanded condition, and ~~to~~ at the third finger radius when the drum is in the fully expanded condition.

11. (withdrawn) The process of building a tire on a tire building drum having an expandable center section (720) and two expandable end sections (722, 724), comprising the steps of:

(a) applying an innerliner on a flat application surface of the tire building drum while the center section 720 and the end sections 722 and 724 are in their collapsed conditions;

(b) expanding both the center section 720 and the end sections 722 and 724 to an intermediate expanded condition to form a pair of spaced recesses on the center section of the drum;

(c) applying a pillar insert into each recess of the center section 220 whereby the application

surface across the building drum is substantially flat;

(d) applying a first ply 508 onto the substantially flat application surface, followed by applying post inserts 510 atop the first ply 508 and substantially above the pillar insert 506, followed by applying a second ply;

(e) moving a pair of beads into place above fingers F of a bead lock assembly in each of the expandable end sections 726.

(f) expanding each the bead lock assembly and the center section 720 to their fully-expanded positions so that the fingers F grip the inextensible beads;

(g) turning up the innerliner, first ply and second ply about the beads;

(h) collapsing the bead lock assemblies 726 and the center section 720 to the collapsed position; and

(i) removing a completed green tire carcass from the drum.

12. (withdrawn) The process of building a tire on a tire building drum (700) having an expandable center section (720) and two expandable end sections (722, 724), comprising the steps of:

(a) applying an innerliner on a flat application surface of the tire building drum while the building drum and the end sections are in their collapsed, unexpanded conditions;

(b) expanding both the center section 720 and the end sections 722 and 724 to their intermediate expanded conditions;

(c) applying pillar inserts followed by a first ply 508 followed by post inserts 510 followed by a second ply onto the center section;

(c) moving a pair of beads into place above a bead lock assembly in each of the expandable end sections 726.

(f) expanding each the bead lock assemblies and the center section 720 to their fully-expanded positions so that the beads are secured in place;

(g) turning up the innerliner, first ply and second ply about the beads;

(h) collapsing the bead lock assemblies 726 and the center section 720 to the collapsed position; and

(i) removing a completed green tire carcass from the drum.

13. (new) The tire building drum of claim 4, wherein:

different length stop blocks are used in conjunction with the at least one rod extending from

the first piston for adjusting the second finger radius as determined by axially inward movement of the first piston.

14. (new) A tire building drum having an axis, a center section and two end sections; wherein:

each end section is provided with an expandable bead lock assembly having a plurality of axially extending, circumferentially spaced-apart finger segments adapted for gripping a bead; such that each of the finger segments is expandable from a first finger radius in a collapsed condition of the bead lock assembly, to a second finger radius in a semi-expanded condition of the bead lock assembly, and to a third finger radius in a fully expanded condition of the bead lock assembly;

the center section is circumferentially segmented, having a plurality of axially elongate, radially fixed, non-expanding segments circumferentially alternating with a like plurality of axially elongate radially expanding segments; and

each of the expanding segments is expandable from a first drum radius when the drum is in a collapsed condition, to a second drum radius when the drum is in a semi-expanded condition, and to a third drum radius when the drum is in a fully expanded condition.

15. (new) The tire building drum of claim 14, wherein:

both axial end portions of the expanding segments are contoured to have annular recesses in their radially outer surfaces at positions corresponding to the positions of sidewall inserts which will be applied to a tire carcass being laid up on the drum.

16. (new) The tire building drum of claim 14, wherein:

each of the finger segments is positioned at the first finger radius when the drum is in the collapsed condition, at the second finger radius when the drum is in the semi-expanded condition, and at the third finger radius when the drum is in the fully expanded condition.

17. (new) The tire building drum of claim 14, wherein:

each bead lock assembly comprises: a carrier ring; a plurality of radially expandable segments; and a plurality of elongate links extending between, and pivotably connected at respective ends to, the carrier ring and radially inner ends of the expandable segments; wherein the finger segments are disposed at radially outer ends of the expandable segments; and wherein axial movement of the carrier ring causes radial movement of the expandable segments and the finger segments; and

the tire building drum further comprises: a cylinder having a cylindrical piston portion; a first piston disposed in the piston portion; a second piston disposed in the piston portion axially between the first piston and the carrier ring; and at least one rod connecting the second piston to the carrier ring;

wherein axial movement of the second piston causes axial movement of the carrier ring; and wherein axial movement of the first piston indirectly causes axial movement of the carrier ring only by axially pushing the second piston.

18. (new) The tire building drum of claim 17, further comprising:

at least one rod extending from the first piston through an end plate of the cylinder for limiting axial movement of the first piston.

19. (new) The tire building drum of claim 18, wherein:

different length stop blocks are used in conjunction with the at least one rod extending from the first piston for adjusting the second finger radius as determined by axially inward movement of the first piston.

20. (new) The tire building drum of claim 18, further comprising:

pneumatic lines connecting to passageways within the cylinder;
wherein by selectively applying pressurized air in the pneumatic lines, the first and second pistons can be moved axially within the piston portion of the cylinder.

21. (new) The tire building drum of claim 20, wherein:

the first piston and the second piston are each generally in the form of flat discs, and both are centered on the axis, and each has substantially the same outer diameter as the other.